



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

“ This new ellipsoid *touches* the old one at the ends of the given mean axis ; but it also *cuts* the same old or given ellipsoid, in a system of two ellipses, contained in planes perpendicular to the asymptotes of the focal hyperbola.

“ If the semiaxes of the given ellipsoid be a, b, c , the common distance of the two *foci* of the new or derived ellipsoid (of revolution) from the common centre of the two ellipsoids, is expressed by the formula

$$e = \frac{\sqrt{(a^2 - b^2)} \sqrt{(b^2 - c^2)}}{\sqrt{(a^2 - b^2 + c^2)}}. \quad (1)$$

“ And I venture, although with diffidence, to propose the name of the TWO MEDIAL FOCI, for the two points thus determined on the mean axis $2b$ of the ellipsoid a, b, c . If their vectors be denoted by $\pm \epsilon$, the equation of that original ellipsoid may be thus written :

$$T(\lambda_1 + \epsilon) + T(\lambda_1 - \epsilon) = 2b; \quad (2)$$

or thus,

$$T(\lambda_1 - \epsilon) = b + b^{-1} S. \epsilon \lambda_1; \quad (3)$$

where

$$\lambda_1 = \frac{\rho\eta - \theta\rho}{\eta + \theta}; \quad \epsilon = \frac{2V \cdot \eta\theta}{T(\eta + \theta)}; \quad (4)$$

η, θ, ρ , having the same significations as in notes recently read ; while e may perhaps be called the MEDIAL EXCENTRICITY of the ellipsoid abc .

“ In a future communication I may be induced to return on the quaternion analysis employed, and to submit to the Academy some account of it.”

Mr. M. Donovan concluded his paper on the Universal Vitality of Matter.

He remarked, that the title of his paper on the Universal Vitality of Matter had led some persons to imagine that he believed every kind of matter to be endued with life, understood in the common acceptation of the word, than which

nothing could be more ridiculous, or farther from his views, which he explained as follows :

“ I have shown that there are various kinds or degrees of life ; such as that of a man in full possession of health and faculties ; of a man who neither sees, hears, feels, tastes, breathes, nor circulates blood, yet is alive and recovers his powers ; of a body recently *dead*, as is the expression, in which certain secretions take place, and which is still susceptible of certain stimuli. I have referred to the vitality, in some cases persistent, of an amputated limb ; to the retention of life, for a short time, in the decollated heads of men and other animals, in their headless trunks, in small portions of their flesh when removed, in their detached hearts, and in their blood. I have instanced the symptoms of life in vegetables, and also of a peculiar life in some organic beings of so feeble a nature that for ages it had been uncertain whether they were animals or vegetables, and the vital principle was never proved to exist in them. Life is then a quality which assumes almost as many varieties, degrees, and modes as there are classes and states of animals or vegetables.

“ I have suggested that it were contrary to the order of nature to suppose that life is utterly extinguished at the point usually called inanimate ; that Nature’s works glide from one form to another by imperceptible gradations ; that it would be a striking anomaly if the general analogy of her proceedings were departed from in this instance, and if there were nothing intermediate to fill up the vast chasm supposed to exist between life and actual exanimation. I have endeavoured to render it probable that there is a grade of life, not recognizable to our senses, and beneath that of the meanest vegetable, which may be exalted by natural processes to the highest degree of intellectual vitality. This low grade is what I call the vitality of matter.

“ But, beside all considerations of analogy and probability, I have adduced the testimony of Scripture to prove that the

Almighty infixed vitality in matter along with its other properties: for the command given to all created things, vegetable and animal,* to increase and multiply, must have been accompanied by the endowment of matter with the means of obeying the mandate, namely, with the vital principle. As matter could not become alive of its own accord, the vital principle must have been either infixed in it as an universal and permanent property, or it must be infused into it in each individual case of vivification by divine power. But God must have intended that the command to increase and multiply should be carried into effect without his further interposition in each particular instance ; for if this were not intended there would have been no occasion for the general order given to organized beings to multiply. There must be something congenial to the human mind in the idea that life is one of the elements of which matter is composed ; it has been shown that it was a principle in the philosophy of the ancient Egyptians, of the Pythagoreans, the Peripatetics, the Stoics, the Platonists, the Pantheists, the Hylozoists, and the Magi. It was an accredited opinion of many eminent moderns, as Kepler, Hunter, and Coleridge ; and it is still entertained by Bremser and a host of others.

“ This view of the subject advances us one step towards the explanation of the phenomena of vivification ; for it is more easy to comprehend the intension and remission of a variable quality than its first creation. If life exist as a property of matter, we can understand that it may be modified in a variety of ways, according to the degree of vitality with which the animal or vegetable is to be endued. The kind of life which I suppose to exist in inorganic matter, and which may be called elementary life, is of the lowest character, more feeble than that of the meanest vegetable existence ; it is here conceived to be one of the properties of matter, and to be sub-

* See Gen. i. 11, 20, 24, 28.

ject to change or modifications, like the other properties of matter, when chemical affinity is exerted with the result of producing combination. The act of combination always produces more or less alteration of the chief properties of the combining bodies, and therefore it may be presumed that so important a property as vitality does not escape the universal change, and that by a succession of such modifications it may be exalted to any required degree. This happens in some way which art cannot accomplish, but which may be closely imitated during the operation of that kind of chemical affinity which produces voltaic phenomena. The voltaic current possesses so much the character of life that it overpowers the real vital principle in the living, simulates it in the dead, and actually restores it to a body which, to all appearance, had ceased to live, and never would have breathed more.

“As to the manner in which these exaltations of vitality are brought about, nothing but conjecture can be offered; several modes may be imagined. It is indisputable that there are many kinds of life, as has been already evidenced in the different conditions of animals and vegetables. It has been the chief object of this Essay to render it probable that there is a different and lower grade of vitality, this being a property of all inorganic matter; and the mode of reasoning on this question was, that such an assumption accords best with the phenomena of Nature. When chemical action occasions new combinations, a change in the vital state of the matter concerned may take place amongst the alterations of properties which always occur in these cases; and the subject of the new combinations may pass into one or other of the states just mentioned.

“This view is taken under the assumption that life in different instances is different in kind; but an explanation may be conceived, under the supposition that it differs in degree, the kind remaining the same throughout, in which case the

differences of vitality induced by chemical combination would amount to mere differences in intensity.

“ A third mode of conceiving the change of character which the vital principle may undergo in consequence of chemical combination may be the following. It may be supposed that the vital principle, in its most exalted form, is not simple or uncompounded, but combines in itself the attributes which belong to human vitality, to the vitality of the lower animals, and to that of vegetables. Remove the attributes of man, and the vital principle is degraded to that of the inferior animals; withdraw also the attributes of the inferior animals, and the vital principle becomes elementary; it is reduced to that lowest degree which is a mere property of matter. But matter is peculiarly adapted to recover its lost attributes, when other kinds of matter, possessed of these attributes, enter into combination with it.

“ This, of course, is all hypothesis; but it is certain that there are different kinds of life, that one kind may be made to pass into another, and that any of the foregoing assumptions may be employed in explaining such conversions: the facts are quite independent of modes of explanation.

“ The transition from what is generally considered total lifelessness to the vital state is in some cases so easy that there is reason to believe the two conditions to be less opposed or remote from each other than is generally supposed. It has been shown that some creatures, to all appearance lifeless, may be brought to life by wetting them; yet, in some instances, they had been for twenty-seven years dead in the common sense of the word, and would have for ever remained so. Others had been killed by immersion in alcohol several times in the space of a few hours, and revived each time. Vegetable substances afford similar examples of facility of resuscitation, after 1000 or even 3000 years of total quiescence of vitality. To explain these phenomena by pronouncing

them cases of suspended animation were to disguise a plain fact by a metaphor. Is it meant that the onion was in a swoon for 3000 years, and that the creature dried up and withered for twenty-seven years, had been dead and alive at the same time? Unless this be the meaning I cannot conceive any other.

“ That one kind of life may be made to pass into another, was shown by tracing the progress of vivification of food, from the period of its being taken into the stomach, to that of its constituting part of the animal’s body.

“ Facts were adduced in support of the argument that by chemical combination vitality is developed in the combining particles; and in proof that the vitality of these particles belongs to them, and not to a common stock contained in the body of the animal, it was shown that parts of the animal body may be removed, yet still retain their vitality; that they may even be replaced, and continue to live; nay, that they may live and grow on the body of some other animal.

“ The chief principle involved in these speculations is no doubt an hypothesis. But an hypothesis, in the absence of an adequate induction, may be tolerated in physics, when it agrees with the phenomena, and connects, in one uniform system, a series of propositions which, without it, would remain insulated. Under such circumstances an hypothesis has its chance of being a truth, and is not to be utterly, in all cases, condemned, notwithstanding the denunciation of Newton: hypotheses have rendered good service in some departments of physics.”